



Structural Development of Tensile Type Bolted Connections for Temporary Emergency Bridge Focusing on Rapid Election

Yuma Sugimoto, Takashi Tamaguchi

YAMAGUCHI & SUGIMOTO, Osaka City University, Osaka, Japan

Yuki Mineyama

MINEYAMA, Technology Headquarter, Bridge Design Department, Komaihaltec Inc., Osaka, Japan

Contact: ysugimoto@bradg.civil.eng.osaka-cu.ac.jp

Abstract

Recently in Japan some cases have been reported that the bridge washed away by tsunamis. For this reason, emergency temporary bridges are required for restoration after these disasters. Shortening the construction time of such bridges is a major issue. This study deals with the desirable structural details of the main girder end plate connections for an emergency temporary bridge by using FE analysis. Two concluding remarks were mainly revealed in this study. Firstly, the cope hole of the end plate at the intersection of the lower flange and the web plate reduces the bolt axial force increment near the intersection because this bolt became not to be subjected to the tensile force from the web. Secondary, the long tensile connection type is effective for reducing the axial force increment because the prying force isn't occurred on the connection surface and the contact stress after tightening the bolts make the separation between end plates almost zero.

Keywords: end plate connections; long tensile type connections; emergency temporary bridge; high strength bolt; PC-rod; prying force.

1 Introduction

Recently in Japan some cases have been reported that the bridges are washed away by tsunamis or floods. And a development of emergency temporary bridges is required for restoration after these disasters. Easy construction is one of the significant features of such emergency temporary bridges, because the assembly time of these bridges on site is closely related to lives saving and early restoration. For this reason, such of bridges must be constructed within 72 hours. An

emergency temporary bridge has been developed by the ministry of Land, Infrastructure and Transport (MLIT) in Japan as shown in Figure 1. This bridge can span 60m within 72 hours. A 25ton rough terrain crane can pass through this bridge. Although there are large demands of emergency temporary bridge like this in Japan, the number of these bridges is still less. A new emergency temporary bridges should be developed. While these bridges being developed or designed, the connection details, which are closely related to construction time, is important. Accordingly, this study focused on main girder connection details of emergency temporary bridges for rapid